JPL OCIO Enterprise Information Technology

Enterprise Information Architecture for Mission Development

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Problem Statement: JPL Today

Parts Catalogues
Item Data

Electronic Libraries
Documents

E-Mail Archives
Messages

What did I call it?
Where did I put it?
How do I find it?

Financial Data
Budget Reports

Engineering Repositories
Drawings, Models

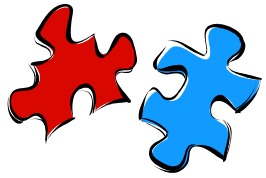
Problem Reporting
Data, Reports

How Do I Look For Information?

Does Mars Polar Lander =
MPL 98? MPL? Mars PL?

- Terms are used inconsistently
- Terms vary from system to system
- Documents and associated Objects are often separated
  - Search is most often time consuming and unsuccessful
  - Design and engineering rationales frequently lost for mission teams of the future

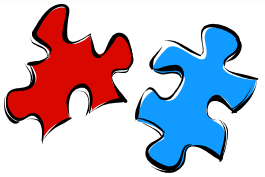
The Solution: An Integrated Enterprise Information Architecture



A **Unified View** of our information space

- Integrated with business processes and best practices
- Based on institutional policies and common architecture
- Independent of any specific repository or technology
- Able to deal with harmonization of information according to a larger point of view
- Relevant and useful to our customers

Expressed with shareable metadata and its values (taxonomy)



Information Building Blocks

An integrated information architecture is made up of several components:

- Common Metadata Specification
  - Core Metadata Specification for JPL Information Objects
- Common language (Controlled vocabularies)
  - By discipline, product, life cycle, process, etc.
  - NASA Taxonomy, JPL Taxonomy, Partner Taxonomies
- Business Rules for data reconciliation
  - You say “to-ma-to” and I say “to-mah-toh”

The Various Uses of Metadata

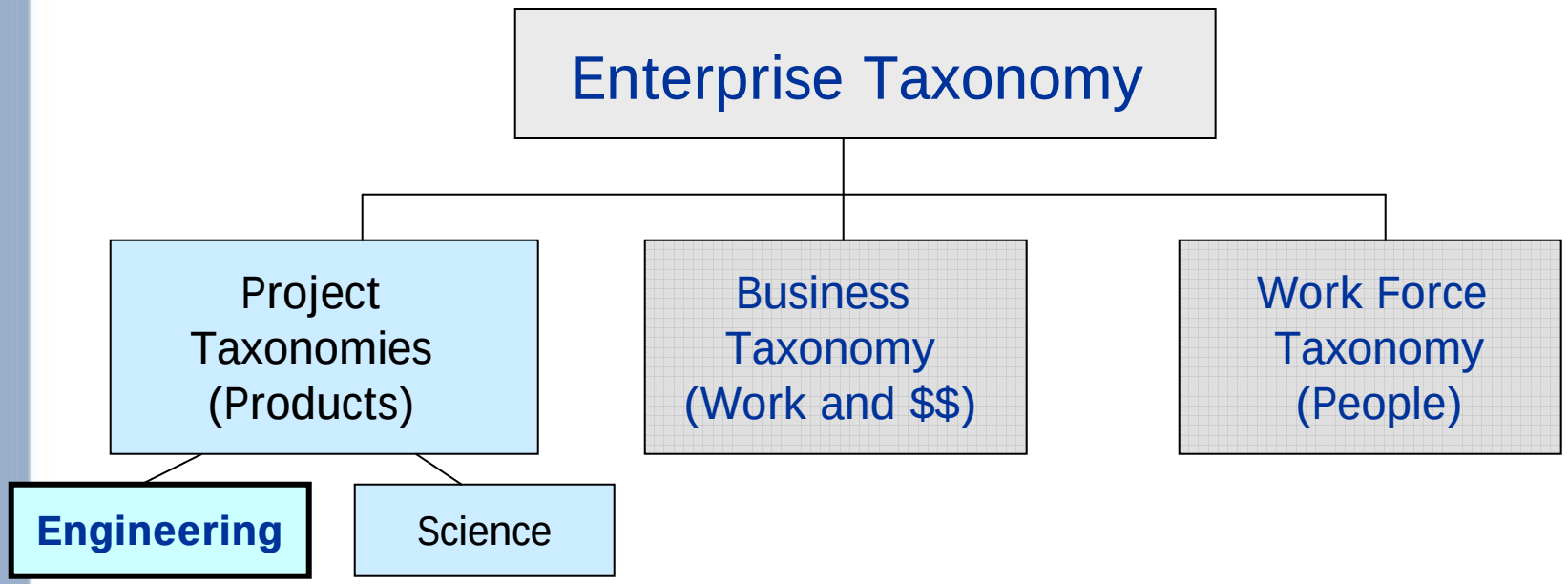
Metadata Classes

- Enables rules for rationalization and search across disparate repositories
  - Identify and distinguish
    - Who produced the content and who is the owner
  - Search and Browse
    - What is the content about
    - Enables information discovery
  - Use Management and Records Compliance
    - Publication venues and access rights
    - Retention and other compliance issues

- JPL Metadata Core Specification for Project Documentation

Developing A Tiered Taxonomy

- Knowledge Domains require varying processes, work flows and vocabularies
- Enterprise Information Architecture is tiered, some tasks require more granularity in a vocabulary than others.
- There is overlap between Domains in the “white spaces of knowledge”.



JPL Enterprise Project Taxonomy Goals

- Tightly integrated with JPL Project Metadata Core Specification
  - Provides vocabulary values for the appropriate metadata fields
  - Designed to be relevant for a domain of users (communities of practice)
- Provides a classification scheme for identifying content
  - A means for tagging content so it can be used and reused in different contexts
- Derived from JPL standard gold sources
  - Vocabulary owners are Subject Matter Experts in their domains
  - Discoverable with Service Oriented Architectures or Semantic Web technologies

JPL Enterprise Taxonomy - Built on a Solid Foundation: NASA Taxonomy

Facets	Strategic Value
Access Requirements	Sensitivity and access control
Audiences	Who the content is intended for
Business Purpose	Why the content was created
Competencies	Relevant field or discipline
Content Types	The genre of the content
Industries	External partners & businesses
Instruments	Flight payloads that yield science
Locations	Sites where work occurs – on and off Earth
Missions/Projects	NASA's lines of business
Organizations	NASA organizations
Subject Categories	The topic of the content

Adding JPL Specific Fields

JPL needs unique attribute sets that enable significant business processes

Definition	Value Sets
Mission Phase	Mission Life Cycle
WBS	Work Breakdown Structure
Document State	Content Versioning
System/Subsystem	Spacecraft structures
Repository	Where the object resides
Document Class	Is the object under CM?
Document Level	Project Hierarchy
Role	Who uses the Content

What is the Semantic Web and Why Is It Relevant?

- Today's Web is made for people to read and understand
- Tomorrow's Web will be made for computers to read and understand
  - Systems can perform transactions across applications without human help
  - Leverages the vast amount of data accessible on the Web for machine processing
  - Enables semantic unification of disparate data based on relationships and inferencing
  - Uses RDF for assertion statements and OWL for logic
  - Information can be advertised as a service available for query

Using the NASA Taxonomy to Associate JPL Vocabulary Terms

NASA Taxonomy

Content Types
- Designs and Specifications
- Quality Control

PFR Vocabulary Terms

- Problem Failure Report
- Incident Surprise Anomaly
- Engineering Design Specifications
- Instrument Procedures

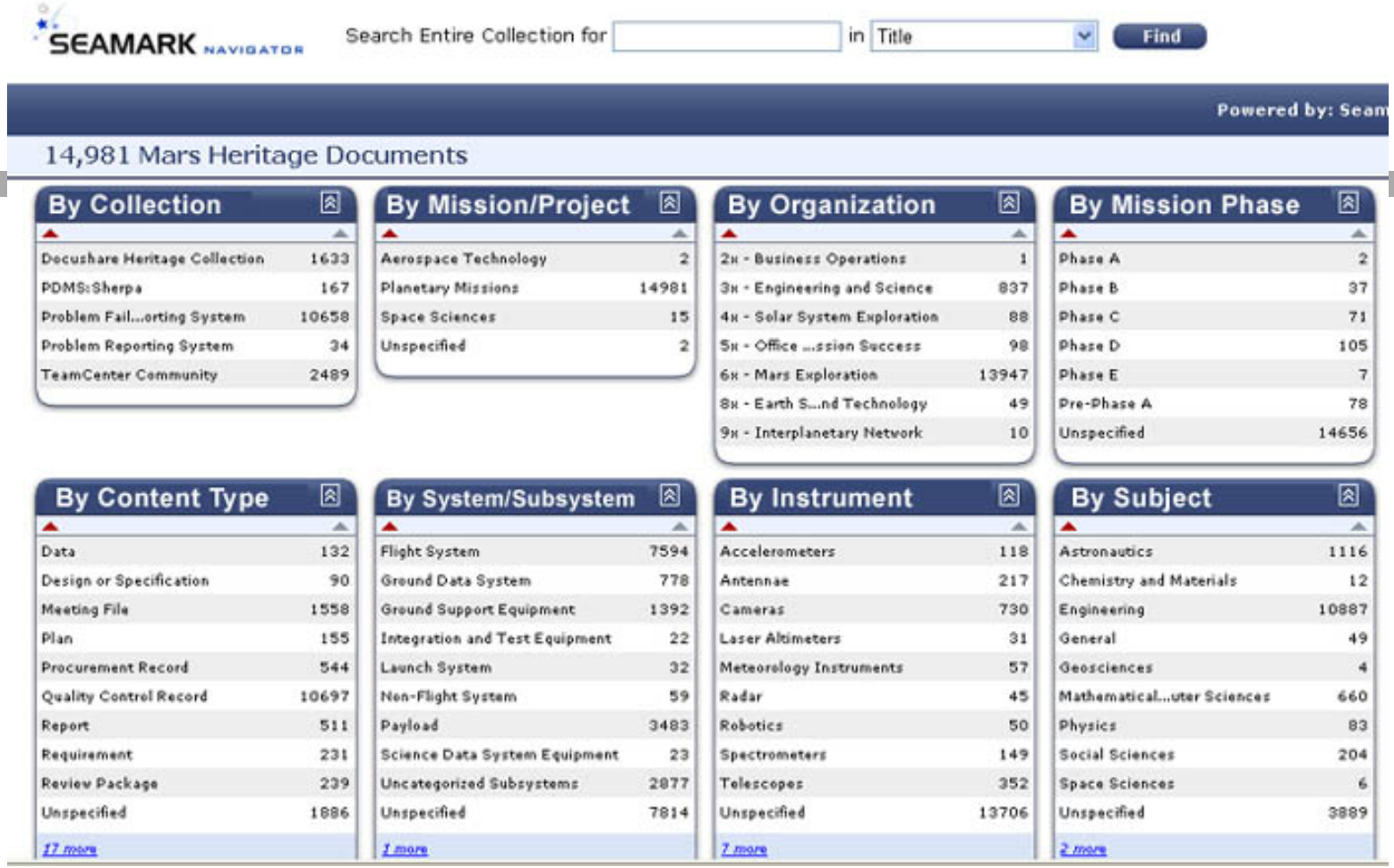
Cassini Electronic Library Terms

Re-Combined through RDF

Validation: Faceted Navigation Prototype for Engineers

Semantic Search/faceted navigation for Flight Projects

- JPL Engineering Domain
- Pilot funded by JPL Chief Engineer
- For flight teams on Phoenix Mission
- Completed in 6 weeks
- Goal: Provide cross repository search from a single interface based on
  - Relationships of information objects
  - Life cycles – mission and content
  - Task analysis for specific roles
  - Engineering processes implemented with work flow



Phoenix Search Pilot – Intuitive Browse by Category

15,000 Items ~ 5 Repositories ~ Sponsored by the JPL Chief Engineer

Further Use Cases: Faceted Navigation Using Relationships

- Project Manager:
  - "I'd like to check all documents needed to complete my Certification for Launch to see what state they're in, no matter where they are."
- Cognizant Engineer:
  - "I'd like to see all problem failure reports on a sub-system I designed and flew 5 years ago so I can incorporate the lessons learned into my current mission."
- Project Information Management Engineer:
  - "I'd like to see the status of all Phase B documents that I need to prep for an upcoming gate review so I know we're ready."
- Fabrication Shop Manager:
  - "I'd like to see all drawings in the approval release cycle so I can plan to staff my shop appropriately to get all the work done on schedule."

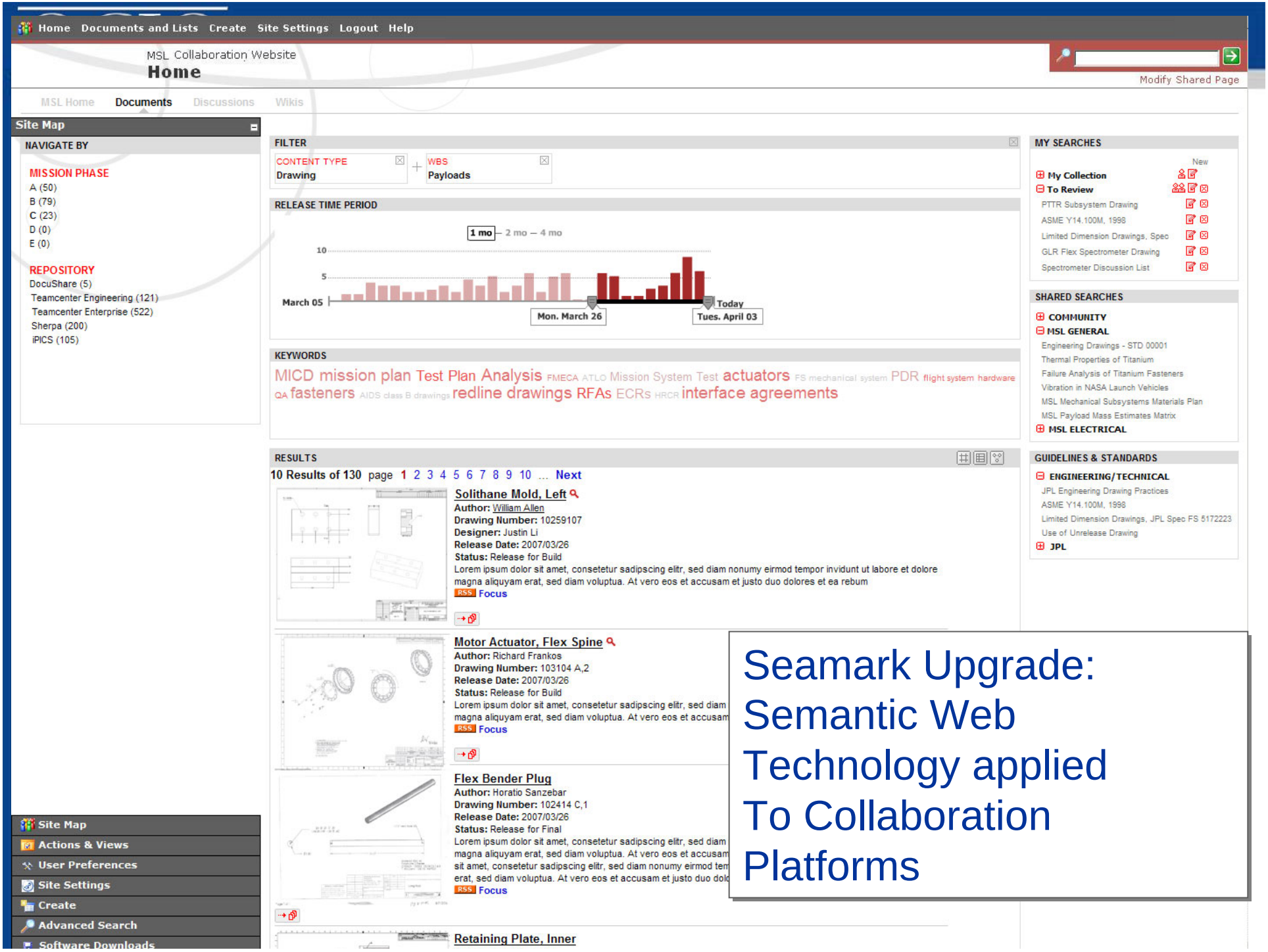
The Business Value of Common Data Models

- Data models identified in each domain allow us to work across repositories in a unified manner increasing:
  - Data integrity, business intelligence, nimbleness of the enterprise
- Decreasing IT developer time on:
  - Data validation, individual development of common data values, maintenance of common data values, presenting information graphically through dashboards or other collaborative tools
- Decreasing Flight Teams' time on:
  - Retrieving information, synthesizing information, managing documentation for reviews, managing budget information

This method improves JPL's business efficiency greatly!

On the Horizon

- Collaborative spaces for virtual spaces based on
  - Mission Life cycle
  - Content types
  - Systems and subsystems under development
  - Engineering processes
- New capability
  - Visualization – dashboards, charts, graphs
  - Saved searches, subscribed searches, personal searches, team searches
  - Faceted navigation by relevant attributes
  - Workflow enabled by
  - Metadata about people, places and things giving a 360 dg view of the knowledge space


Home Documents and Lists Create Site Settings Logout Help
MSL Collaboration Website
Home
Modify Shared Page
MSL Home Documents Discussions Wikis
Site Map
NAVIGATE BY
MISSION PHASE
A (50)
B (79)
C (23)
D (0)
E (0)
REPOSITORY
DocuShare (5)
Teamcenter Engineering (121)
Teamcenter Enterprise (522)
Sherpa (200)
iPICS (105)
FILTER
CONTENT TYPE
Drawing
WBS
Payloads
RELEASE TIME PERIOD
1 mo
2 mo
4 mo
10
5
March 05
Mon. March 26
Today
Tues. April 03
KEYWORDS
MICD mission plan Test Plan Analysis FMECA ATLO Mission System Test actuators FS mechanical system PDR flight system hardware QA fasteners AIDS class B drawings redline drawings RFAs ECRs HRCR interface agreements
RESULTS
10 Results of 130 page 1 2 3 4 5 6 7 8 9 10 ... Next
Solithane Mold, Left
Author: William Allen
Drawing Number: 10259107
Designer: Justin Li
Release Date: 2007/03/26
Status: Release for Build
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RSS Focus
Motor Actuator, Flex Spine
Author: Richard Frankos
Drawing Number: 103104 A,2
Release Date: 2007/03/26
Status: Release for Build
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RSS Focus
Flex Bender Plug
Author: Horatio Sanzebar
Drawing Number: 102414 C,1
Release Date: 2007/03/26
Status: Release for Final
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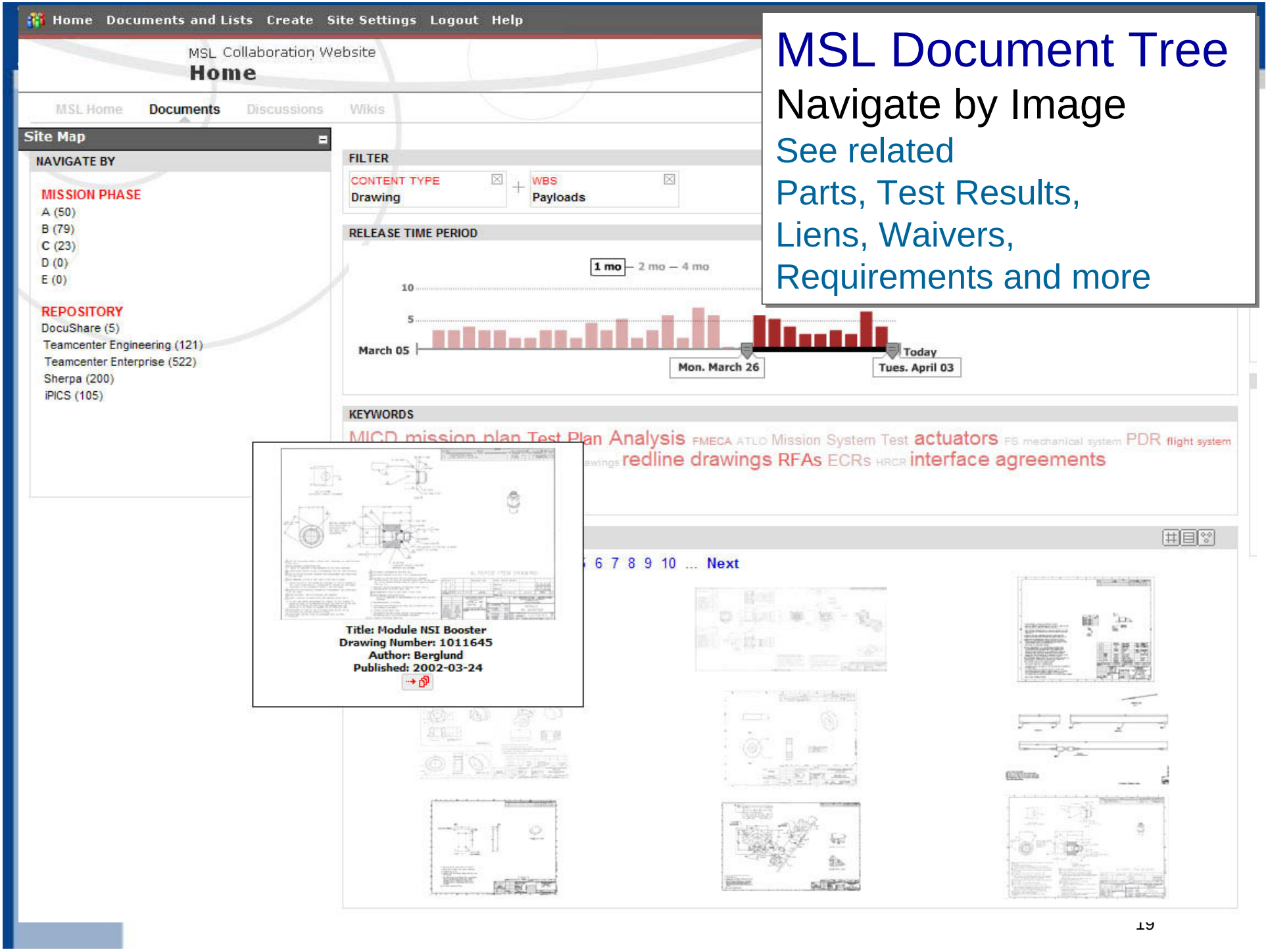
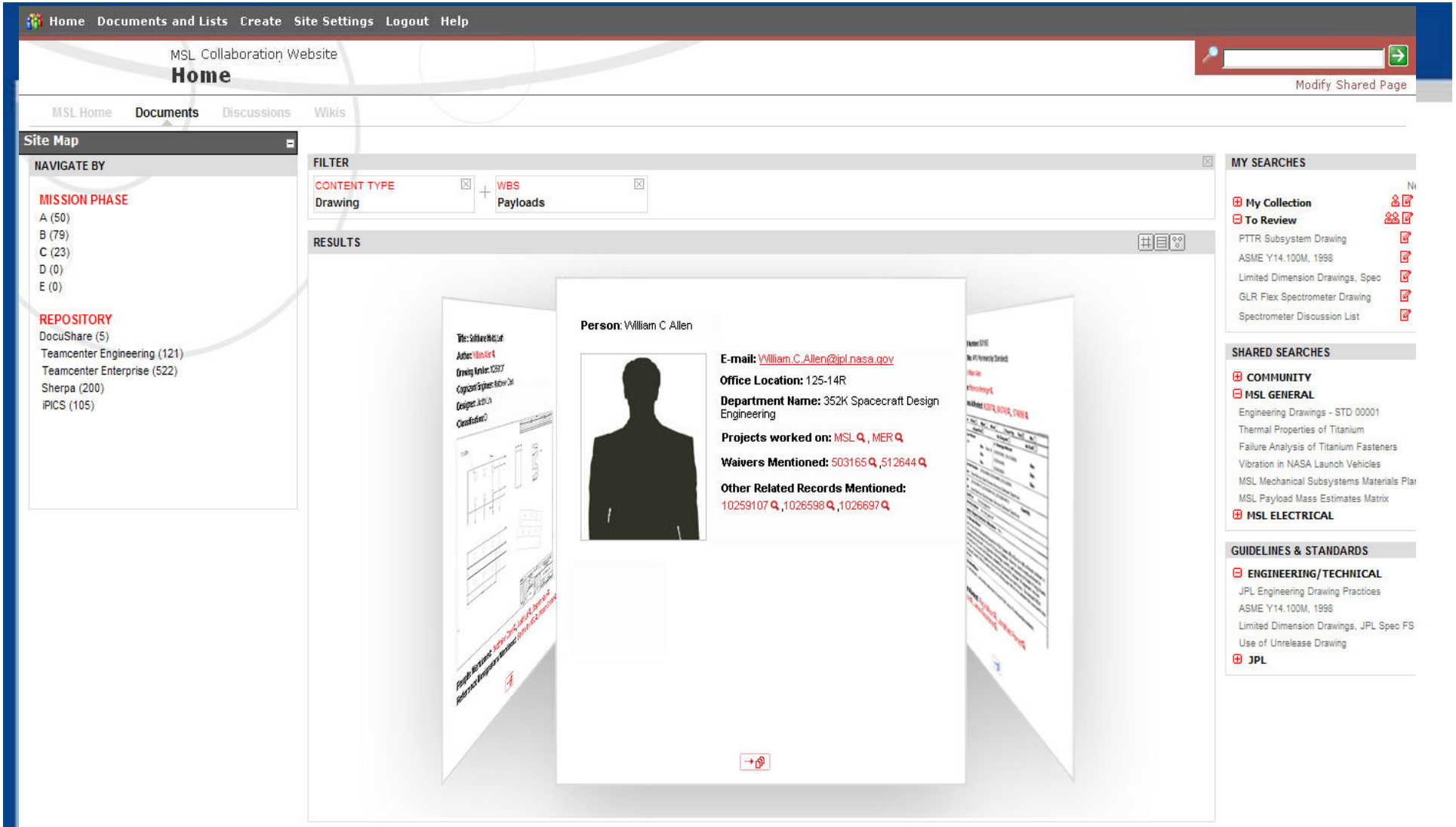
RSS Focus
Retaining Plate, Inner
MY SEARCHES
New
My Collection
To Review
PTTR Subsystem Drawing
ASME Y14.100M, 1998
Limited Dimension Drawings, Spec
GLR Flex Spectrometer Drawing
Spectrometer Discussion List
SHARED SEARCHES
COMMUNITY
MSL GENERAL
Engineering Drawings - STD 00001
Thermal Properties of Titanium
Failure Analysis of Titanium Fasteners
Vibration in NASA Launch Vehicles
MSL Mechanical Subsystems Materials Plan
MSL Payload Mass Estimates Matrix
MSL ELECTRICAL
GUIDELINES & STANDARDS
ENGINEERING/TECHNICAL
JPL Engineering Drawing Practices
ASME Y14.100M, 1998
Limited Dimension Drawings, JPL Spec FS 5172223
Use of Unrelease Drawing
JPL
Site Map
Actions & Views
User Preferences
Site Settings
Create
Advanced Search
Software Downloads
Seamark Upgrade:
Semantic Web
Technology applied
To Collaboration
Platforms

MSL Document Tree

Navigate by Image

See related
Parts, Test Results,
Liens, Waivers,
Requirements and more





Look At Multiple Objects in Context

Includes data on people, projects as well as engineering products

View	Edit	Work Item Name	Project Number	Primary Service	Strategic Goal	Organization	End Date	Commitment State	Investment Domain	Funded
View	Edit	FY08 Subcontractor Wizard Replacement	3303	Acq	Effective IT			Rejected	Utility	No
View	Edit	iProcurement Phase 2 Return capability implement plus Asset Interface	3170	Acq	Effective IT		Jun 30 2007	Active	Enhancement	Unspecified

Charting Capability in Seamark Upgrade

Thank you!

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